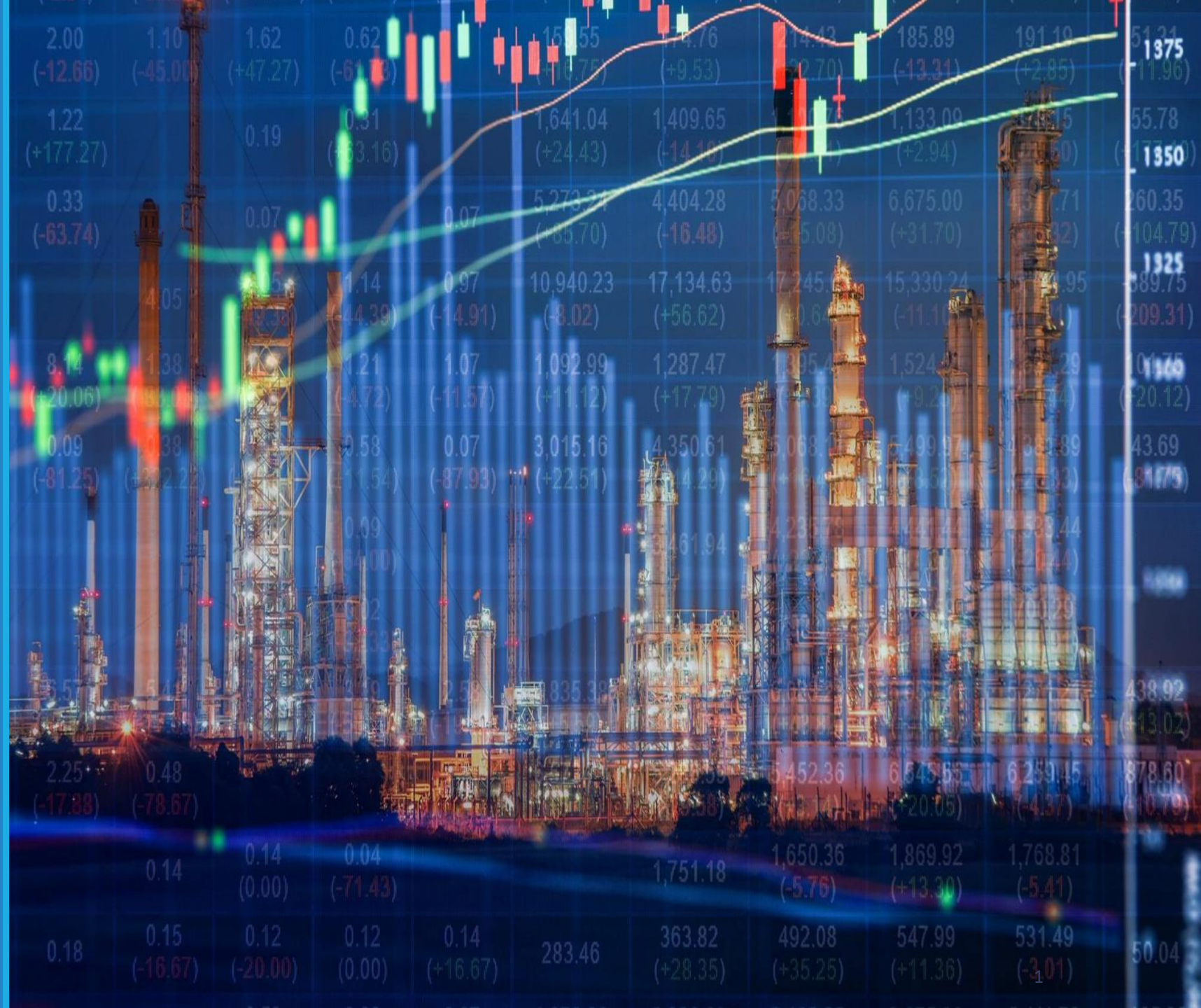
Practicalities of Load Interconnection and Energy Supply

Worlds Collide: Interdisciplinary Consideration for a Future Muon Collider

The Power Bureau

February 2026



Agenda

OVERVIEW	▪ Introductions ▪ Topics
BACKGROUND	▪ Market Structure ▪ Current Market Dynamics
INTERCONNECTION	▪ Process ▪ Costs ▪ Timeline
SUPPLY	▪ Retail Options ▪ PPA / VPPA Options ▪ Wires Charges
DISCUSSION	▪ Open

OVERVIEW

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Introductions: Mark Pruitt

Power Bureau	▪ Advisor on energy policy, planning, and procurement ▪ Retail and Wholesale energy transaction support
Illinois Power Agency	▪ State Agency Director ▪ Managed energy, capacity and renewable energy procurement for ComEd, Ameren Illinois and MidAmerican Energy
Energy Resources Center	▪ Managed electricity and natural gas procurement, hedging, billing, and contracting for executive State of Illinois agencies from a research center at the University of Illinois at Chicago
Nicor Energy Solutions	▪ Supported natural gas cogeneration power plant development for federal facilities in Illinois
Other	▪ Teach energy policy in the MSES at Northwestern University ▪ Research positions at Argonne National Lab

OVERVIEW

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Topics: Mark Pruitt

Background	of the policies, regulations and market conditions in the Northern Illinois region.
Interconnection	Outline of the parties, steps, costs, and timelines associated with securing grid interconnection for large loads in the Commonwealth Edison service region.
Supply	Review of the supply options and wire charges associated with supply service from Commonwealth Edison.

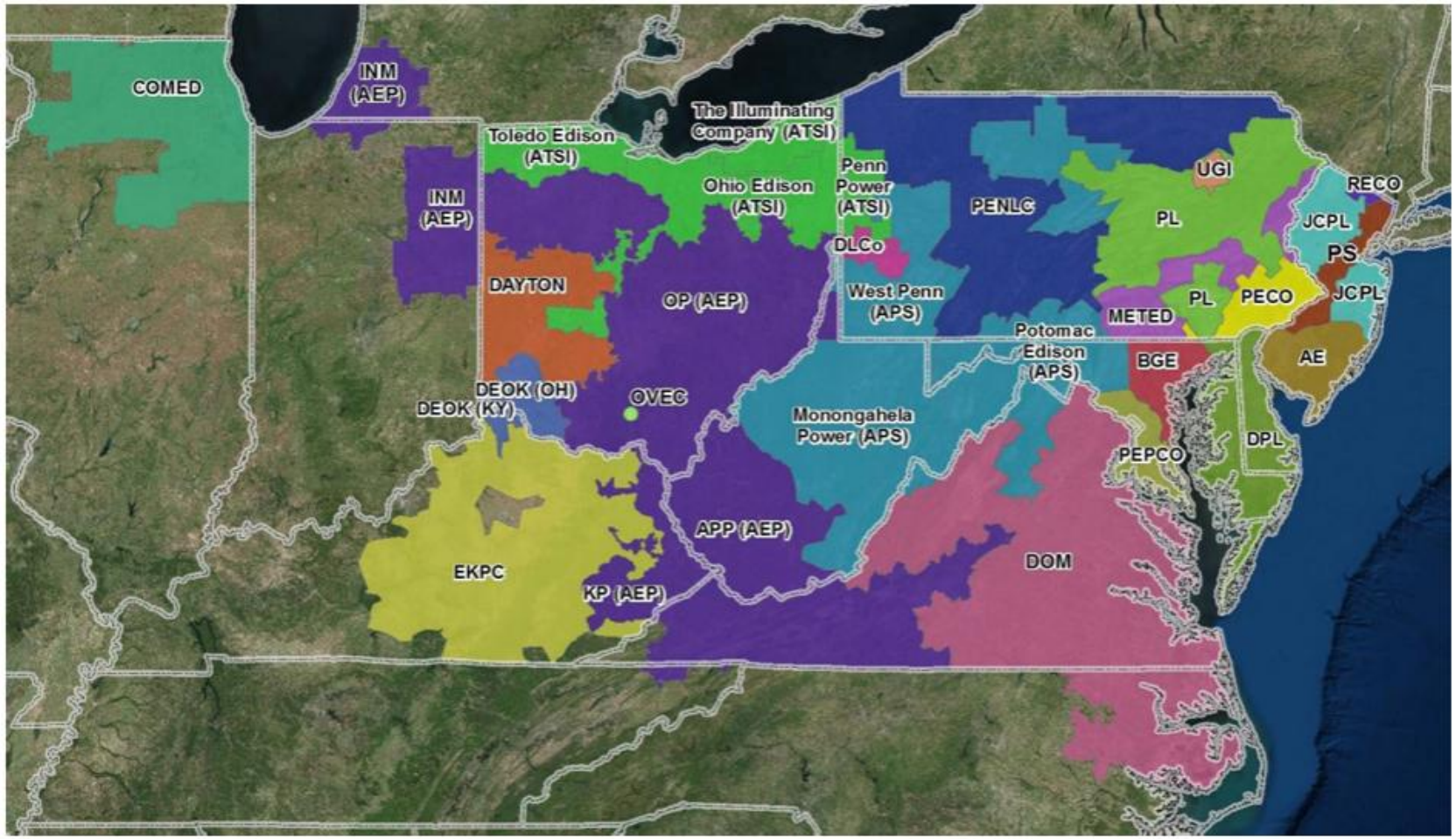
BACKGROUND

BACKGROUND

PJM

- Load Growth
- Resource Adequacy
- Market Response

PJM: The Regional Grid that serves northern Illinois and 12 other states

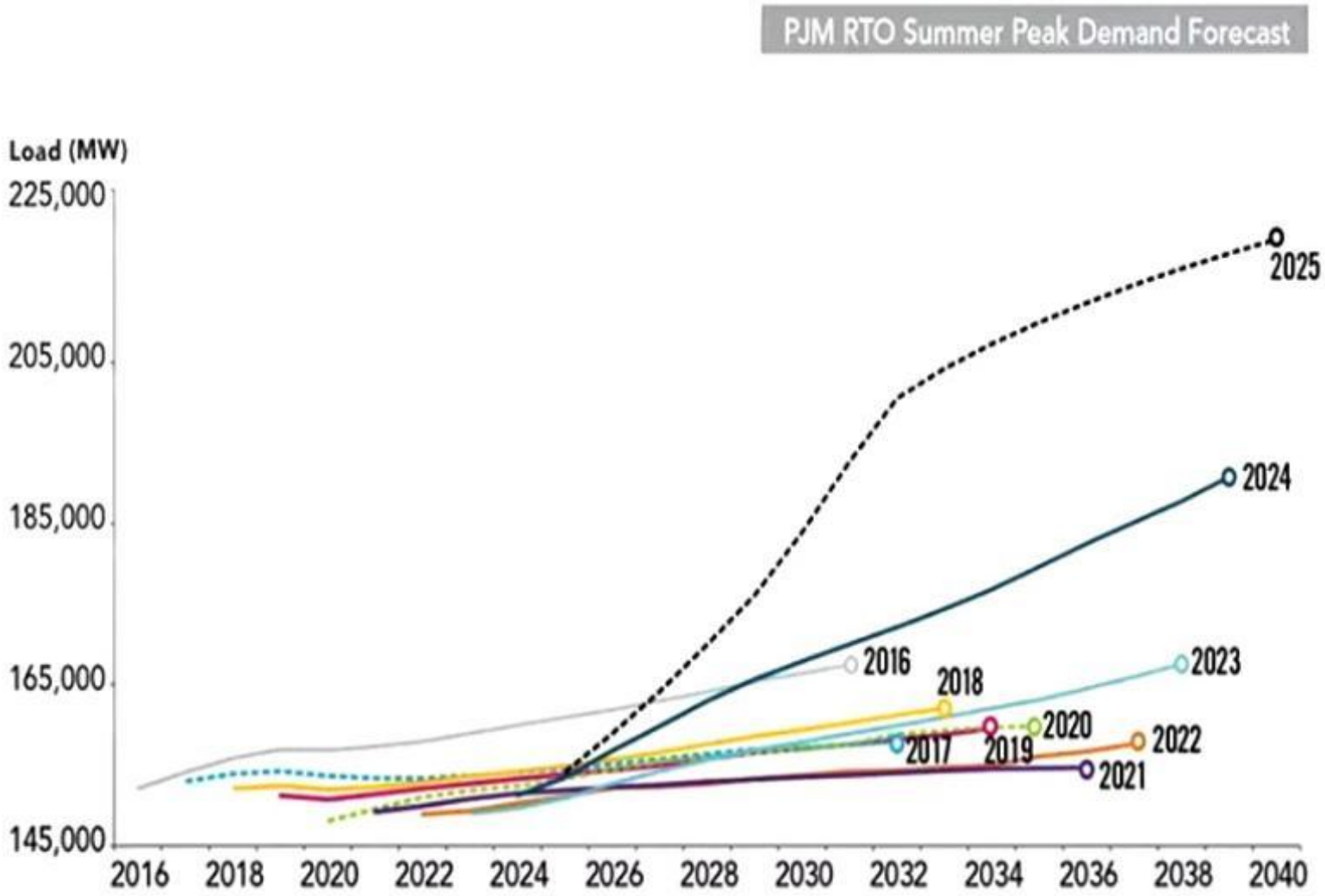


BACKGROUND

PJM

- Load Growth
- Resource Adequacy
- Market Response

Load Growth: Electricity load growth is accelerating



BACKGROUND

PJM

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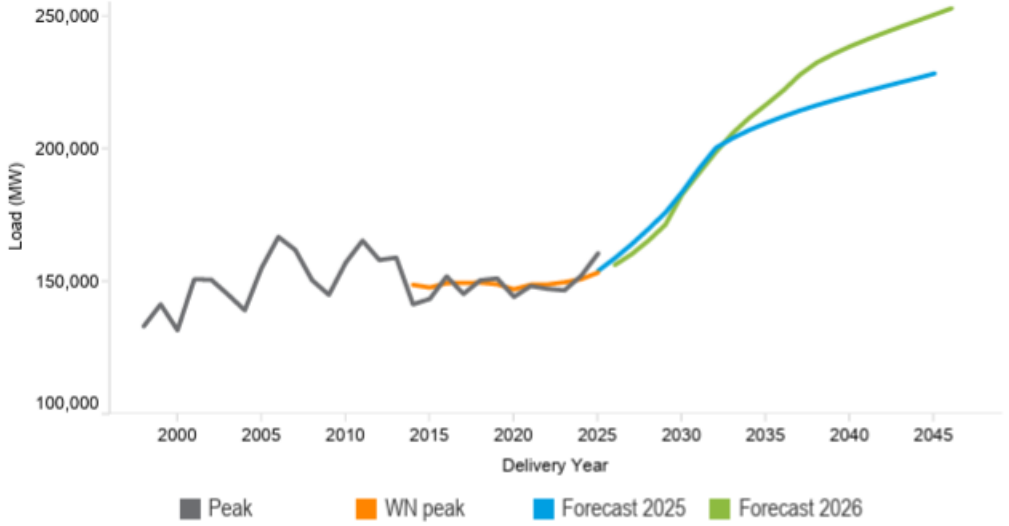
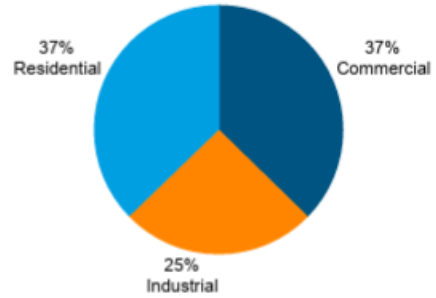
Load Growth: Region-wide Summer and Winter Peak Demand

PJM RTO

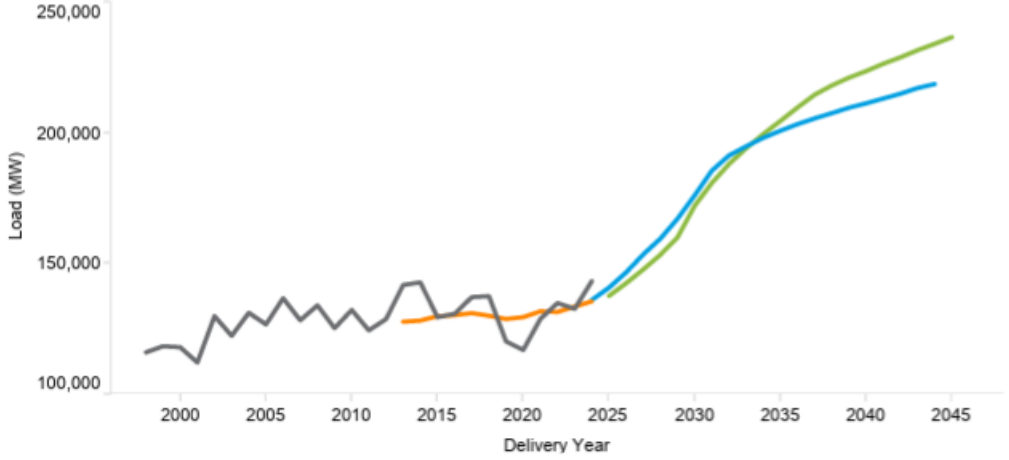
Summer Peak



RCI Makeup



Winter Peak



Weather - Annual Average 1994-2024

Avg Summer Daily Temp	*74.3*
Avg Summer Max Temp	*95.2*
Avg Winter Daily Temp	*34.4*
Avg Winter Min Temp	*4.2*

Zonal 10/15/20 Year Load Growth

SUMMER	3.6%	2.9%	2.4%
WINTER	4.0%	3.3%	2.7%

BACKGROUND

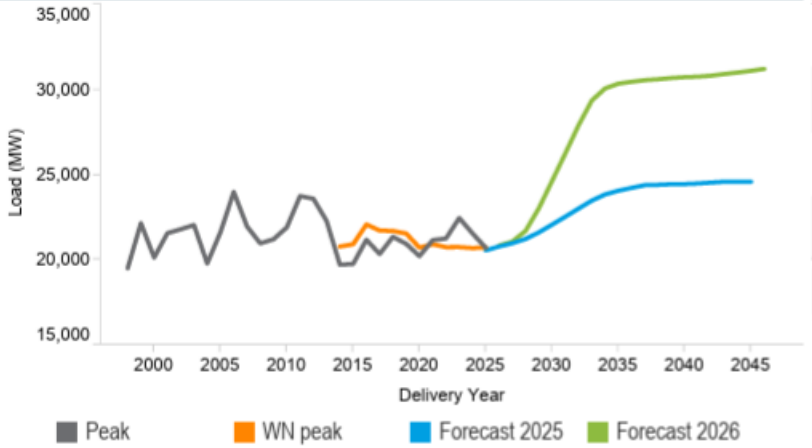
PJM

- Load Growth
- Resource Adequacy
- Market Response

Load Growth: Local load growth in Northern Illinois

Commonwealth Edison (COMED)

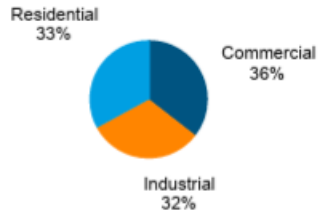
Summer Peak



Weather - Annual Average 1994-2024

Avg Summer Daily Temp	*73.1*
Avg Summer Max Temp	*95.7*
Avg Winter Daily Temp	*28.0*
Avg Winter Min Temp	*-7.3*

RCI Makeup



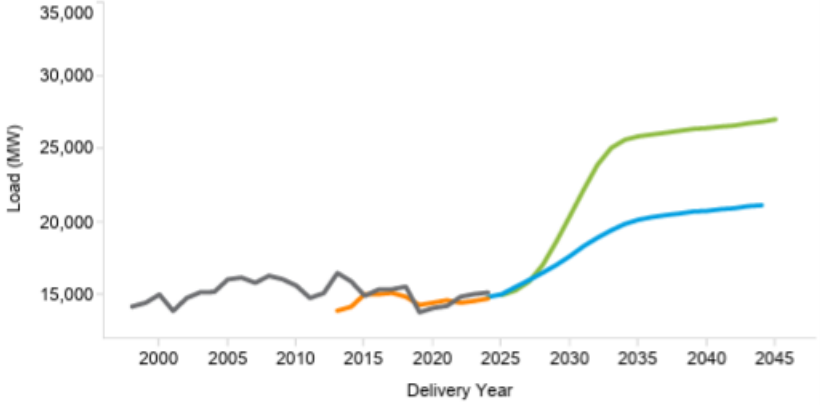
Zonal 10/15/20 Year Load Growth

SUMMER	3.9%	2.6%	2.0%
WINTER	5.6%	3.8%	3.0%

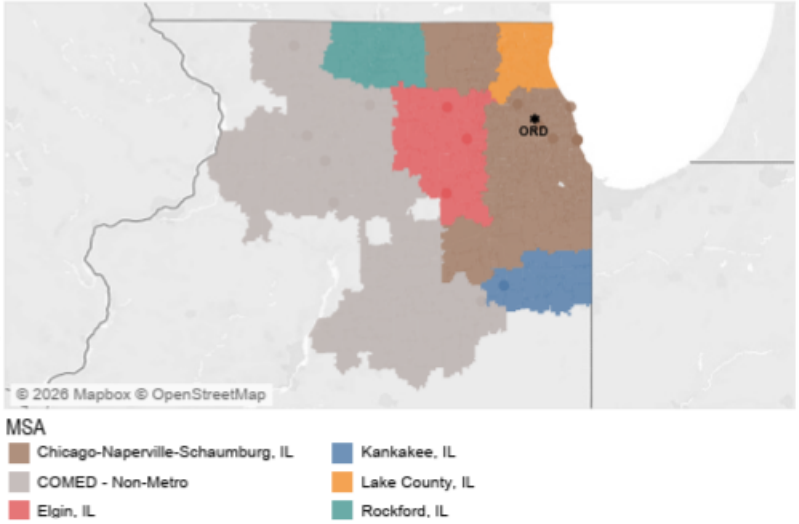
LDAs

PJM WESTERN
PJM RTO

Winter Peak

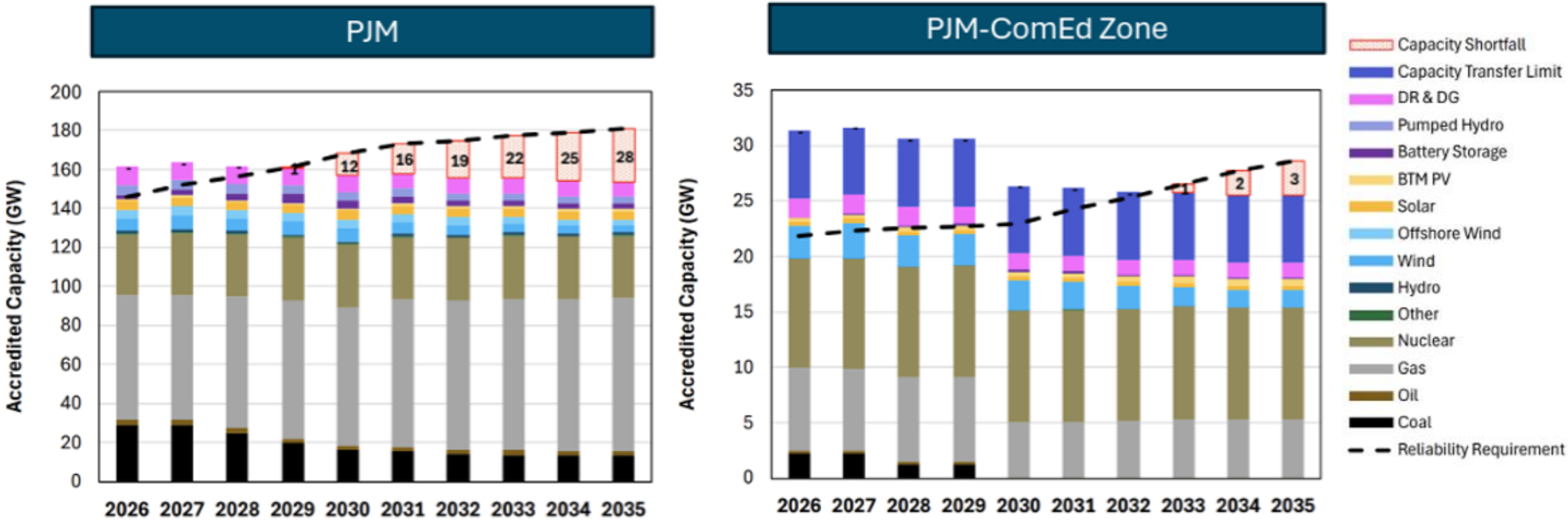


Metropolitan Statistical Areas and Weather Stations



Resource Adequacy: Both PJM and the ComEd Zone within PJM are losing capacity resources as demand grows

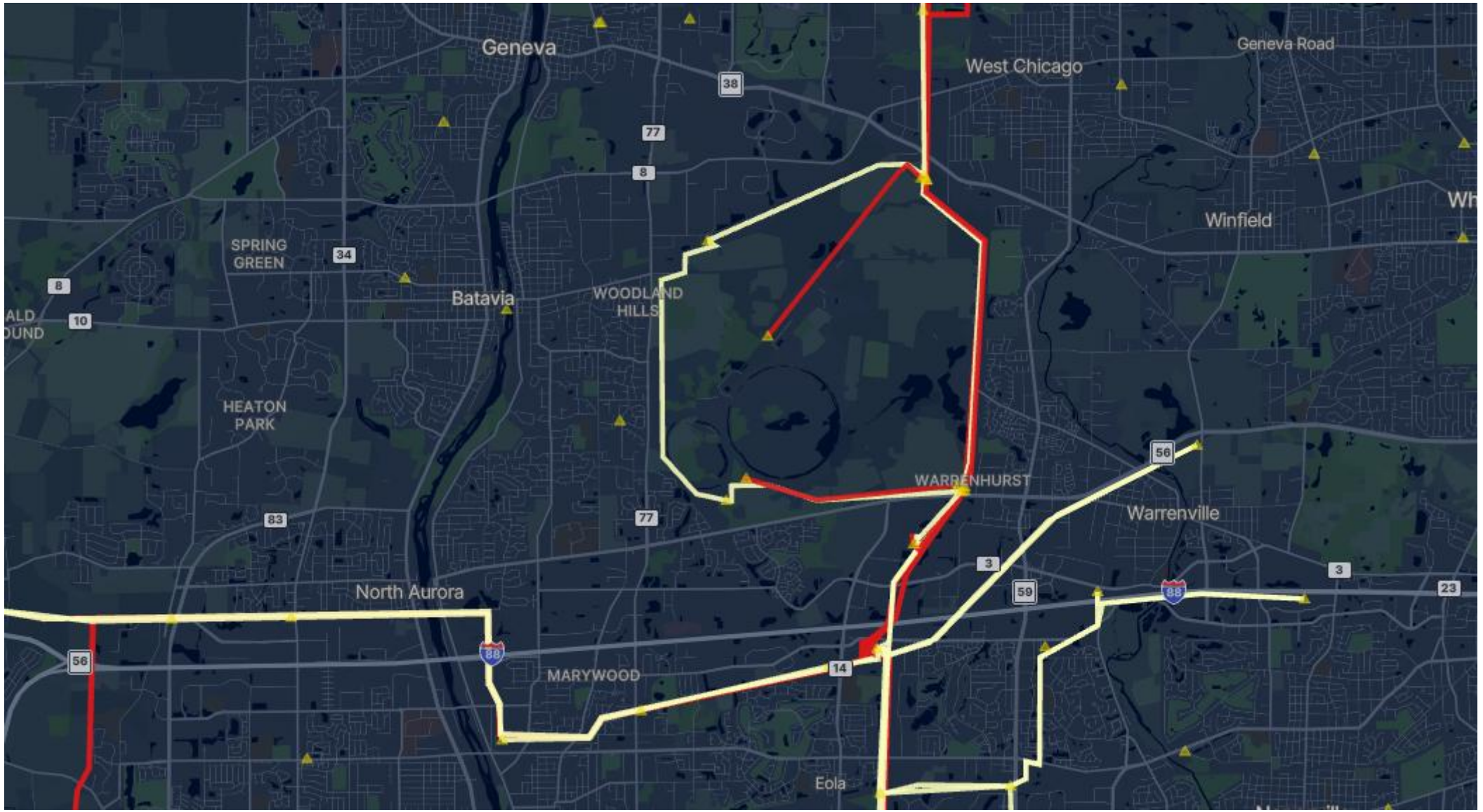
2030: PJM is short 12 GW; ComEd Zone within PJM starts relying on imported capacity in 2030



Market Response: PJM's capacity prices for a single-family home in ComEd rose from $260 (2024/25) to $2,962 (2026/27)

INTERCONNECTION

Interconnection: 138- and 345-kV network surrounding Fermi National Laboratory



Interconnection: Phase 1 (Transmission Cluster Study & Scoping Engineering)

CATEGORY	DETAILS
Overview	**Cluster Study:** ComEd and PJM analysis of the ability of the regional and local transmission network and generating capacity can support groupings of proposed new loads.
	Scoping Engineering: An approved ComEd engineering firm identifies engineering analysis of the scope of work, issuing a ComEd project diagram, and refining the costs (+/-25%) and schedule.
Timeline	~12-18+ Months, including transmission impact cluster study
Deposit Cost	$1 million+, optional long lead material deposits
Requirements	Site control (LOI/PSA), engineering deposit, service application, load ramp schedule, one-line diagram, site plan, transmission planning questionnaire, and prefer a letter of intent (LOI) from a large power user for the location. Customer required easements must be secured during this phase, if needed.

Interconnection: Phase 2 (Detailed Engineering)

CATEGORY	DETAILS
Overview	Additional internal ComEd approvals to conduct detailed engineering to release an "issues for construction" package, order additional long-lead materials, obtain permits, further refine costs (+/-10%) and provide a detailed schedule. All substation land to meet TACO Tier 1 requirements.
Timeline	~12-18+ Months
Deposit Cost	Additional deposit depends on scope of work
Requirements	Additional deposit, continued engagement on project details, service configurations, etc.

Interconnection: Phase 3 (Construction)

CATEGORY	DETAILS
Overview	All field work, livening, commissioning, and testing of facilities that were placed in service. The estimated timeline is contingent on the customer having all required civil construction completed and approved. Transmission network expansions/reinforcements may extend project timelines significantly due to land acquisition needs and regulatory approvals.
Timeline	~12-24+ Months (depending upon scope of work)
Deposit Cost	Remaining project costs from estimates due at start
Requirements	All property rights are secured (easements, acquisitions), permits approved, additional deposit / charges are paid, and continued engagement on construction activities, etc.

Enhanced Deposit Requirements

- $1,000,000 plus $500,000 for each additional whole 100 MW
- Letter of Credit required if the amount of the deposit exceeds $2,000,000
- Requiring deposits to cover long-lead time materials

FERC-approved Transmission Security Agreement

- Transmission Security Agreement (TSA) requires the customer to provide security for any shortfalls in the project's actual contributions toward recovery of the transmission revenue requirement in each of the first ten (10) calendar years

Prioritization of Economic Development Projects

- Changes to GT&C to permit discretionary prioritization of projects that have been formally certified via written notice by the Illinois Department of Commerce and Economic Opportunity (DCEO) or State of Illinois, as having been designated as an economic development priority

SUPPLY OPTIONS

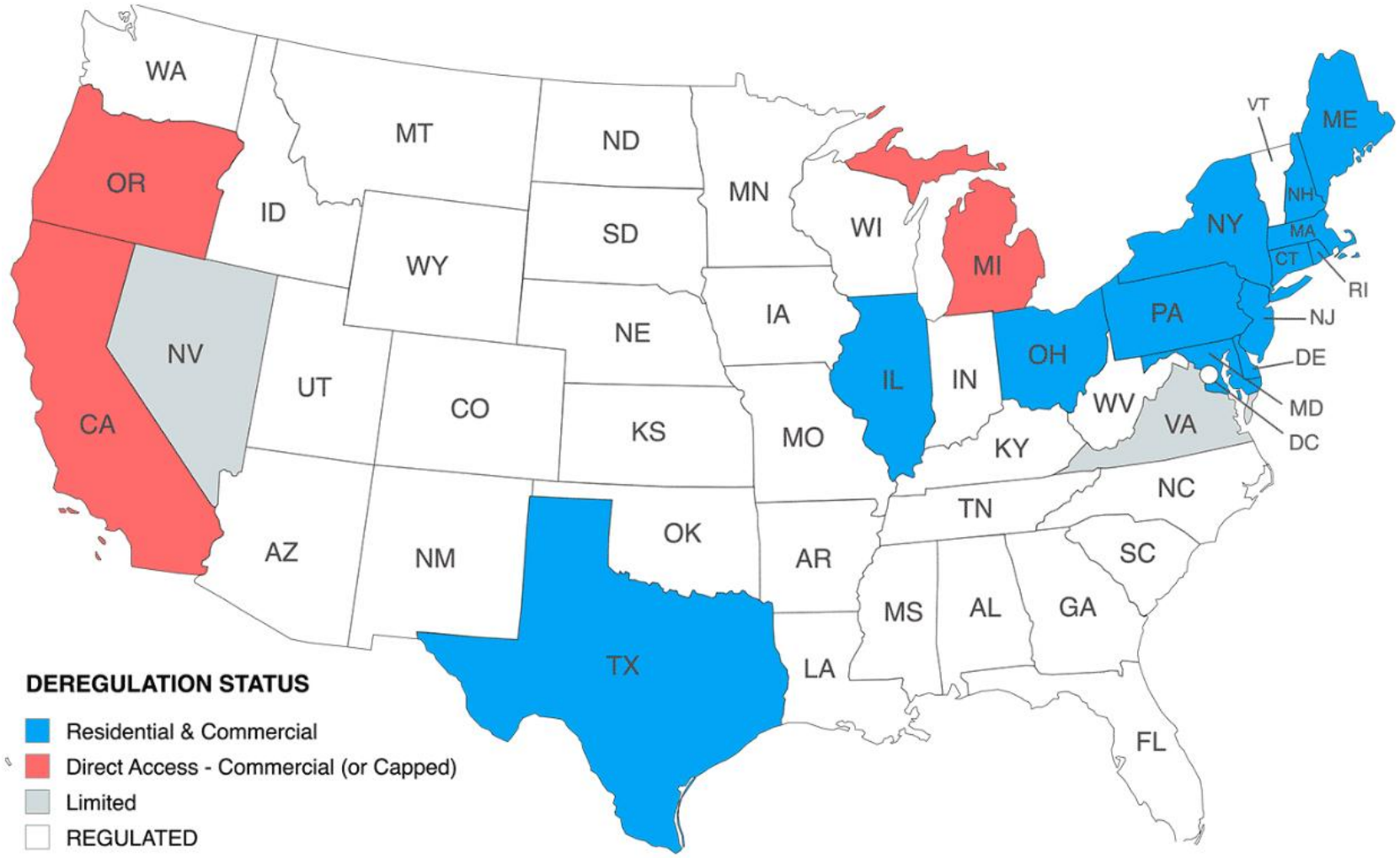
SUPPLY OPTIONS

Supply

- Default Service
- Retail Supply
- Virtual Power Purchase Agreement

Wires Charges

Consumer Choice: Consumers can negotiate energy commodity price



SUPPLY OPTIONS

Supply

- **Default Service**
- **Retail Supply**
- Virtual Power Purchase Agreement

Wires Charges

Consumer Choice: Alternative Suppliers to the Local Utility

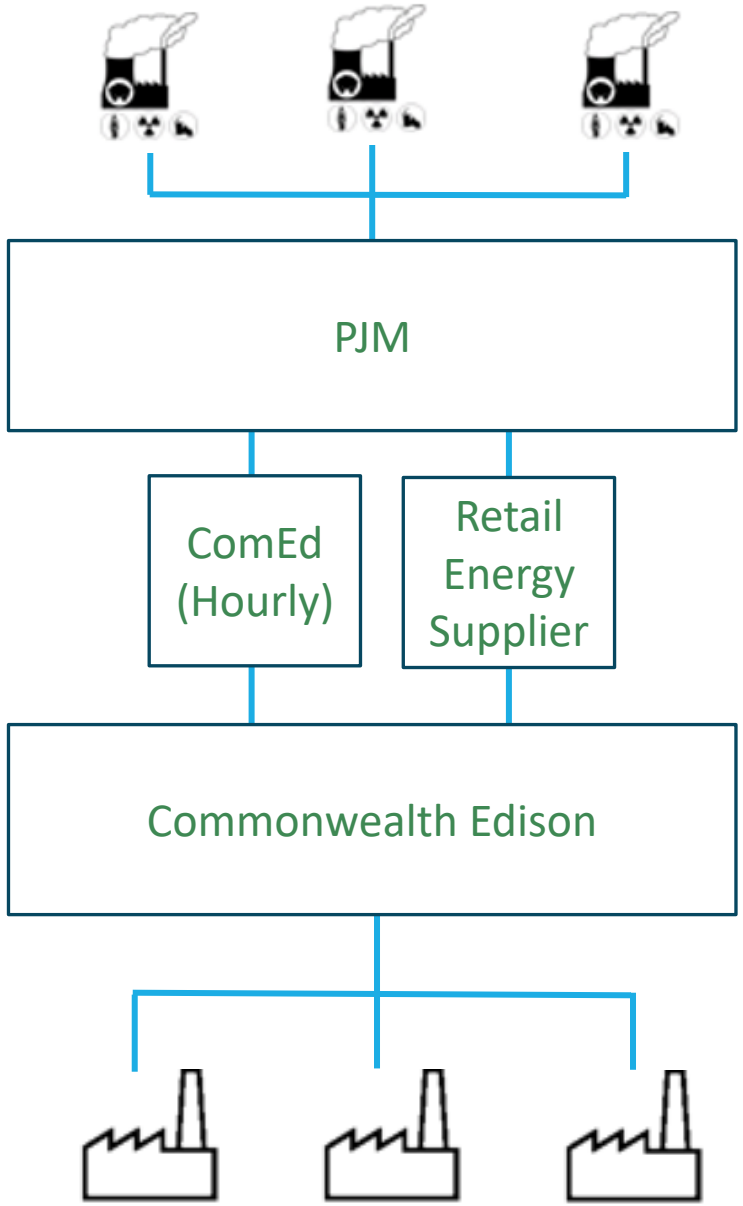
A. Generators deliver power to the regional grid

B. RTO/ISO predicts load, dispatches generators

C. Load Serving Entities schedule load to local delivery company and set prices with consumer

D. Local utility manages retail delivery, billing, meters, programs, customer care

E. Consumers select a RES or default to ComEd Hourly Service



SUPPLY OPTIONS

Supply

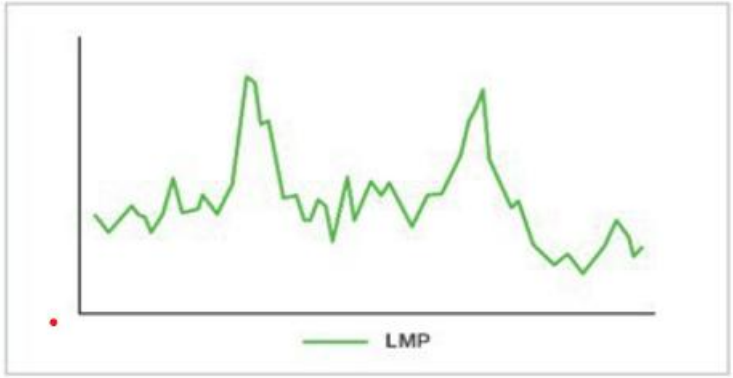
- Default Service
- **Retail Supply**
- Virtual Power Purchase Agreement

Wires Charges

Consumer Choice: Consumers can negotiate energy price structures

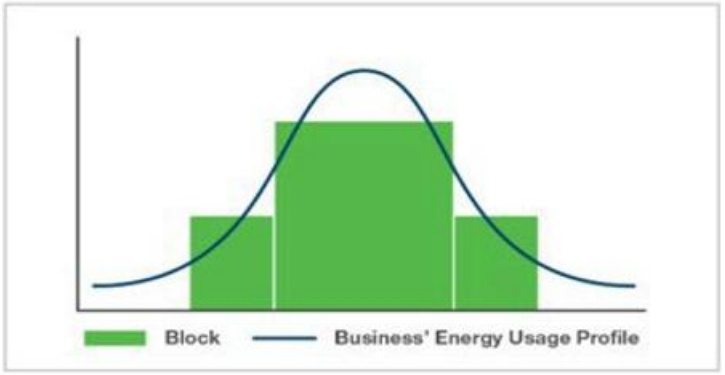
INDEX SUPPLY PRODUCT

STRUCTURE



BLOCK & INDEX PRODUCT

STRUCTURE

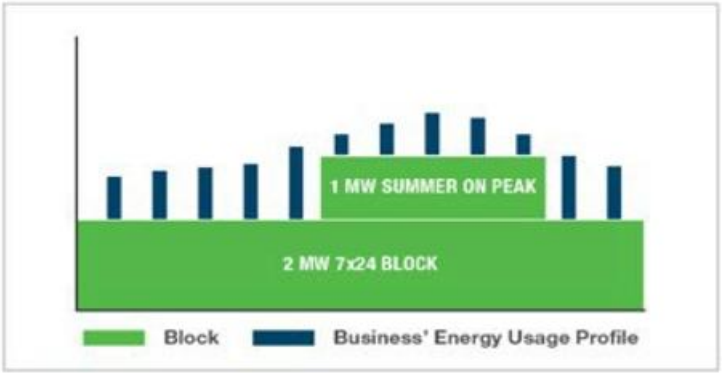


FIXED PRICE PRODUCT

STRUCTURE

LAYERED BLOCK & INDEX PRODUCT

STRUCTURE



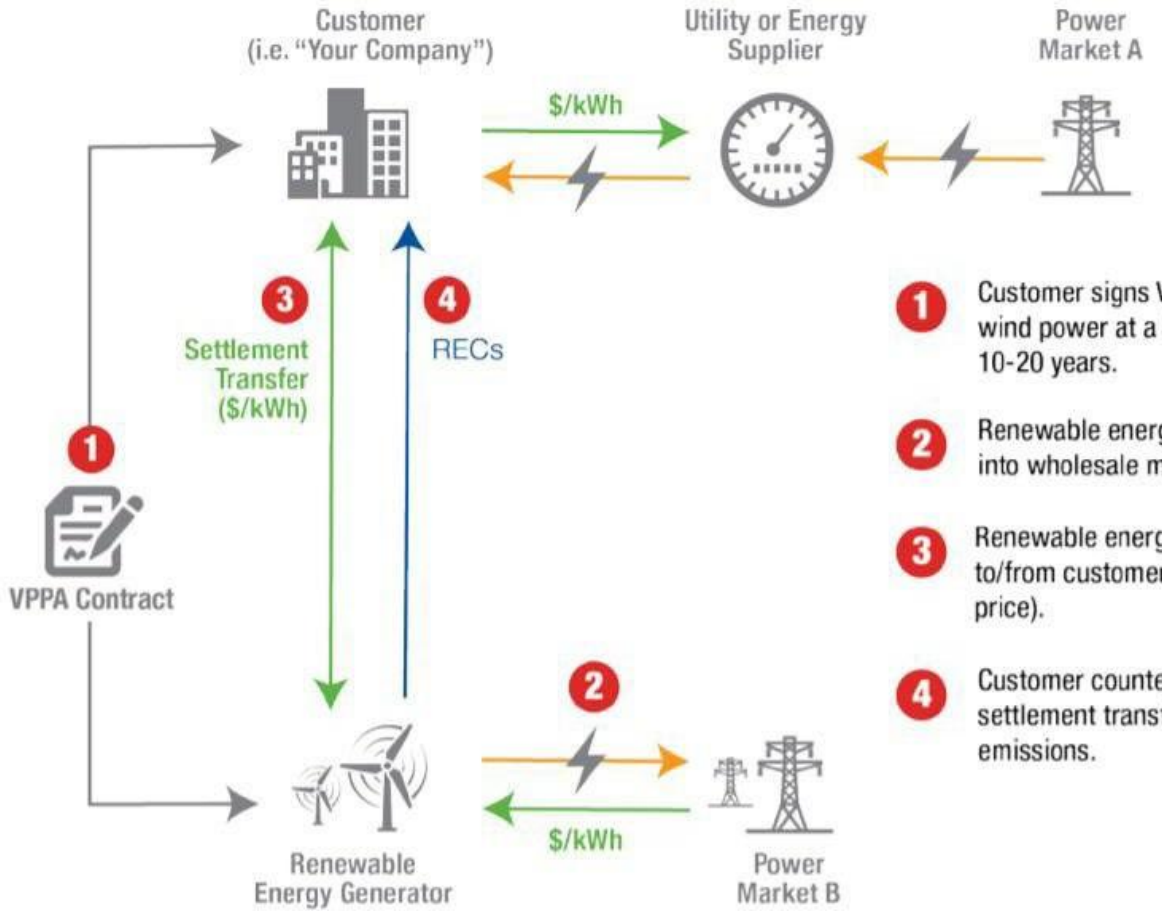
SUPPLY OPTIONS

Supply

- Default Service
- Retail Supply
- **Virtual Power Purchase Agreement**

Wires Charges

VPPA: Creating Additive Renewable Energy Supply



1. Customer signs VPPA with renewable energy generator for wind power at a fixed rate (i.e. strike price). Term is typically 10-20 years.
2. Renewable energy generator sells customer's null power into wholesale market and receives market price.
3. Renewable energy generator sends/receives settlement to/from customer (Settlement = wholesale price minus strike price).
4. Customer counterbalances utility payment for power with settlement transfer, and uses RECs to reduce scope 2 emissions.

SUPPLY OPTIONS

Supply

- Default Service
- Retail Supply
- Virtual Power Purchase Agreement

Wires Charges

Wires Charges: Consumers pay for energy, delivery and Utility Programs

Program	Current Cost ($/MWh)
Rider CFRA – Carbon-Free Resource Adjustment	$41.10
Rider CTS – Coal To Solar	$0.07
Rider ECR - Environmental Cost Recovery Adjustment	$0.10
Rider EEPP – Energy Efficiency Pricing and Performance and Rider EEPA – Energy Efficiency Performance Adjustment	$4.82
Rider ETAC – Energy Transition Assistance Charge	$0.84
Rider LID - Low-income Discount	$457.50/Month (large user)
Rider RCA - Retail Customer Assessments	$37.50/Month (large user)
Rider RCA - Retail Customer Assessments (and Energy Assistance Charge for the Supplemental Low-Income Energy Assistance Fund	$300/Month (large user)
Rider REA - Renewable Energy Adjustment	$5.02
Rider ZEA - Zero Emission Adjustment	$1.89

THANK YOU

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